

Remarks/Arguments:

Claims 104, 107, 108, 110-113, 115, 122 and 126 have been amended. No new matter is introduced herein. Claims 105 and 106 have been canceled. Claims 104, 107-123 and 125-127 are pending.

Applicants appreciate the courtesy extended to their representative by Examiner Hansen during the Telephone Interview of June 3, 2008.

Claims 104, 122 and 126 have been amended to clarify the feature of a "set of light intensity data." In particular, claims 104, 122 and 126 have been amended to clarify that: 1) the sensor includes a plurality of pixels, with each pixel arranged to provide a light intensity data value representing the light intensity associated with a corresponding one of the regions of the sample surface and 2) the sensor is adapted to sense sets of light intensity data, with each set of light intensity data being one frame of light intensity data sensed at one interval along the measurement path and comprising a plurality of the light intensity data values. Claims 104, 122 and 126 have also been amended to clarify that each light intensity data value in the set of light intensity data represents the light intensity sensed by at least one corresponding pixel of the sensor. Basis for the amendment to claims 104, 122 and 126 can be found, for example, at p. 6, lines 11-33 of the subject specification. Claims 107, 108 and 110-113 and 115 have been amended to correspond to amended claim 104. No new matter has been added by these amendments.

Claim Objections

Claims 105 and 106 were objected to under 37 C.F.R. 1.75(c), as being of improper dependent form. Claims 105 and 106 have been cancelled. Accordingly, the objection is moot.

Rejections under 35 USC §102(b)

Claims 104-107, 115, 121-123, 125, and 126 were rejected under 35 U.S.C. § 102(b) as being anticipated by Deck (US 5,953,124). Claims 105 and 106 have been cancelled. Applicants respectfully submit that this rejection, for the remaining claims, is overcome for the reasons set forth below.

Independent claim 104 recites features that are neither disclosed nor suggested by Deck, namely:

...the sensor includes a plurality of pixels, each pixel arranged in the sensor to provide a light intensity data value representing the light intensity associated with a corresponding one of the regions of the sample surface, the sensor adapted to sense sets of light intensity data...

...each set of light intensity data being one frame of light intensity data sensed at one interval along the measurement path and comprising a plurality of the light intensity data values, such that each light intensity data value in the set of light intensity data represents the light intensity sensed by at least one corresponding pixel of the sensor...

...an image enhancer operable to enhance image data representing one set of light intensity data to be displayed on a display to facilitate the detection by a user of the interference fringes... (Emphasis added.)

Independent claims 122 and 126 include similar features. As recited in independent claim 104, this image enhancer facilitates the detection by a user of the interference fringes in one set of light intensity data (i.e. plural pixels with each pixel corresponding to one of the sample surface regions) from a single frame (i.e. a single scan position) that is to be displayed on a display.

Deck discloses interferometric methods and systems that use low coherence illumination and exhibit improved precision and flexibility by applying a phase shifting interferometry (PSI) analysis and a scanning white light interferometry (SWLI) analysis to a single 3D interferogram (Abstract). The 3D interferogram is "an interferogram which is comprised of an ensemble of camera frames of interference data, as opposed to a 2D interferogram which is comprised of only a single camera frame of interference data" (Col. 1, lines 10-18) (emphasis added).

Deck discloses, in Fig. 1, system 10 for obtaining interferometric measurements that includes low coherence source of illumination 12, interferometer 18, imaging array 36, frame grabber 38 and computer 33. Interferometer 18 splits incident light beam 14 into test light beam 24 and reference light beam 26, which are reflected from respective test surface 28 and reference surface 30 and recombined to form recombined light beam 34 (Col. 7, lines 8-19 and lines 30-34). Recombined light beam 34 is directed towards imaging array 36 and an interferogram formed by the recombined light beam 34 is imaged thereon (Col. 7, lines 35-39). The interference data acquired by imaging device 36 is saved by frame grabber 38 and fed to computer 33, which processes the interference data to determine a surface height associated with each pixel of the imaging array 36 (Col. 7, line 59-Col. 8, line 30).

As shown in Figs. 3A and 3B, Deck discloses that intensity curves (51a and 52a) for each pixel in the imaging array may be derived from respective contrast curves (51b and 52b), i.e.

the interference raw data for a single pixel taken over the entire scan (Col. 8, line 50-Col. 9, line 17). Each set of corresponding intensity and contrast curves (51a/b and 52a/b) shown in Figs. 3A and 3B are graphs of intensity as a function of scan position (Z-axis) for a single pixel (Col. 8, lines 50-56 and Col. 9, lines 4-5). The surface height associated with each pixel of the imaging array may then be determined from the contrast peaks (P1 and P2) of contrast curves (51b and 52b). It is noted that Deck does not disclose that these curves are ever displayed by the system.

Deck does not disclose or suggest an image enhancer to enhance image data representing one set of light intensity data, where: a) a plurality of pixels are arranged so that each pixel provides a light intensity value corresponding to one of the sample surface regions and b) the set of light intensity data is one frame of light intensity data sensed at one interval along the measurement path, as required by claims 104, 122 and 126. As recited in these claims, each set of light intensity data includes light intensity values from the multiple pixels of the sensor, all sensed for one frame at a single position along the measurement path. Thus, the recited set of image data that is to be enhanced is within a single frame of light intensity data acquired from multiple pixels at a single scan position. In contrast, Deck teaches generating a 3D interferogram that comprises an "ensemble of camera frames of interference data, as opposed to a 2D interferogram... of only a single camera frame of interference data" (Col. 1, lines 15-17) (emphasis added). Indeed, Deck explicitly disclose, in Figs. 3A and 3B, that each set of corresponding intensity and contrast curves (51a/b and 52a/b) are graphs of intensity for a single pixel over the entire scan (i.e. an ensemble of frames).

On p. 4 of the Office Action, it is asserted, with respect to Deck, that "[o]ne of ordinary skill in the art would recognize that while the surface height is determined for each pixel, as illustrated by Figures 3A and 3B, the CCD would acquire interference data for the entire test surface as the interferometer is scanned." Applicants respectfully disagree. According to Applicants' invention, a set of light intensity data is sensed on a frame-by-frame basis. Deck, in contrast, acquire interference data on a pixel-by-pixel basis for multiple camera frames, to analyze a single 3D interferogram. Deck explicitly describes the inferiority of obtaining a 2D interferogram (i.e., a single camera frame of interference data, as taught by the subject invention). (Col. 1, lines 10-18 of Deck). Accordingly, the skilled person would not consider Deck to teach obtaining multiple 2D inteferograms for the entire test surface.

Furthermore, Deck discloses that intensity curves (51a and 52a) may be filtered to remove rapid intensity variations between the interference data of each pixel at different scan positions, i.e. between different frames of interference data. The purpose of filtering intensity curves (51a and 52a) to derive contrast curves (51b and 52b) from which contrast peaks (P1 and P2) may be determined. (Col. 9, lines 5-17). Deck does **not** disclose or suggest that either the intensity curves or the contrast curves are ever displayed. The only disclosure by Deck regarding displaying any data is that "...the test surface profile can be displayed in a conventional manner" (Col. 10, lines 29-30) (emphasis added). Thus, Deck does not include all of the features of claims 104, 122 and 126.

Because Deck does not include all of the limitations of claims 104, 122, and 126, claims 104, 122 and 126 are not subject to rejection under 35 U.S.C. § 102(b) as being anticipated by Deck, and claims 107, 115, and 121, 123 and 125, which depend from respective claims 104 and 122, are also not subject to rejection under 35 U.S.C. § 102(b) as being anticipated by Deck.

Rejections under 35 USC §103(a)

Claims 108-110 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Deck in view of Ai et al. (US 5,471,303). Claims 108-110, however, include all of the features of claim 104 from which they depend, and are patentable over Deck for at least the same reasons as claim 104. Ai et al. do not make up for the deficiencies of Deck because they do not disclose or suggest an image enhancer operable to enhance image data representing one set of light intensity data to be displayed on a display, as required by claim 104.

Ai et al. disclose an interferometric apparatus that combines white-light vertical scanning interferometry and single-wavelength phase scanning interferometry capabilities to improve the accuracy of height measurements in steep regions and in areas with large inter-pixel steps on the test surface (Abstract). Ai et al. do not disclose any means of displaying image data. Therefore, Ai et al. cannot suggest or teach "...an image enhancer operable to enhance image data representing one set of light intensity data to be displayed on a display..." as recited in independent claim 104 of the present application.

Because there is at least one feature recited in independent claim 104 that is not disclosed or suggested in Deck or Ai et al., singly or in combination, Applicant respectfully submits that this rejection does not set forth a *prima facie* case of obviousness for claims 108-

110. Thus, claims 108-110 can not be subject to rejection under 35 U.S.C. § 103(a) as being unpatentable over Deck in view of Ai et al.

Claims 116 and 117 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Deck in view of Webster (US 4,040,747). Claims 116 and 117, however, include all of the features of claim 104 from which they depend, and are patentable over Deck for at least the same reasons as claim 104. Webster does not make up for the deficiencies of Deck because Webster does not disclose or suggest an image enhancer operable to enhance image data representing one set of light intensity data to be displayed on a display, as required by claim 104.

Webster discloses an automatic test instrument for gauging the percentage of various constituents in organic substances by comparing the reflective optical density of the subject at various wavelengths (Abstract). Webster does not disclose using image data. Therefore, Webster cannot suggest or teach "...an image enhancer operable to enhance image data representing one set of light intensity data to be displayed on a display..." as recited in independent claim 104 of the present application.

Because there is at least one feature recited in independent claim 104 that is not disclosed or suggested in Deck or Webster, singly or in combination, Applicant respectfully submits that this rejection does not set forth a *prima facie* case of obviousness for claims 116 and 117. Thus, claims 116 and 117 can not be subject to rejection under 35 U.S.C. § 103(a) as unpatentable over Deck in view of Webster.

Objected and Allowed Claims

Applicants appreciate the indication that claims 111-114 and 118-120 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants, however, have not rewritten claims 111-114 and 118-120 into independent form, because it is submitted that the base claim is in condition for allowance, for at least the reasons set forth above.

Applicants appreciate the indication that claim 127 has been allowed.

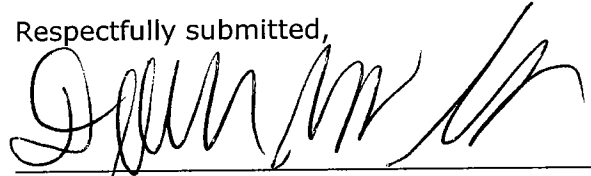
Appln. No.: 10/536,821
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Conclusion

In view of the foregoing amendments and remarks, Applicants request that the Examiner reconsider and withdraw the rejection of claims 104, 107-110, 115-117, 121-123, 125 and 126 and withdraw the objection to claims 111-114 and 118-120.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Kenneth N. Nigon', written over a horizontal line.

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KNN/DMG/ks/pb

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